SMALL APPARATUS FOR DISPENSING CIRCULAR PLATE OBJECTS

FIELD OF THE INVENTION

This invention relates to a discharge apparatus for disc bodies for discharging a disc type coin such as money and a disc type medal used in a game machine. Especially, this invention relates to a discharge apparatus for disc bodies which can simply regulate the thickness depending on the thickness of the desired disc body for which a discharge is desired. Furthermore, this invention relates to a discharge apparatus for changeable disc bodies which can simply regulate the size depending on the size of the disc body. In other words, this invention relates to a discharge apparatus simply applicable to the size of each country coin depending on the coin of each country.

Especially, this invention relates to the discharge apparatus for the disc bodies which can simply change the size of a discharge hole corresponding to the size of the desired disc body which desires a discharge. In other words, this invention relates to the discharge apparatus for the disc bodies which can simply change the size of a discharge hole corresponding to the size of the various coins of each country.

BACKGROUND OF THE INVENTION

As to the discharge apparatus for the conventional disc bodies, the shaft which rotates the disc (for example, the reference number **22** of FIG. **1**) for discharging each coin was a revolving shaft of a gear apparatus. And, the revolving shaft (for example, the reference number **19** of FIG. **1**) of a gear apparatus had gear with the rotating shaft of an electric motor. In other words, as to the discharge apparatus for the conventional disc bodies, the disc for a coin discharge was arranged beside (off set from) the rotating shaft of an electric motor. In other words, as to the discharge apparatus for the conventional disc bodies, the disc for a coin discharge was arranged beside the rotating shaft of an electric motor and was fixed to the revolving shaft of the coupled gear apparatus.

Moreover, the washer (not shown) depending on the thickness of the coin was installed to the revolving shaft of the disc for a coin discharge. In other words, the height of the thickness for a substrate (for example, the reference number **11** of FIG. **1**), i.e., the height of the coin disc, was adjusted with the washer.

Therefore, the rotating shaft of an electric motor and the revolving shaft of the gear apparatus arranged horizontally are arranged in parallel. However, since these revolving shafts are in a separated position mutually, the whole apparatus becomes large horizontally. In addition, since the revolving shafts of a gear apparatus was locked by screw to the disc for a discharge when a user exchanged the disc for a coin discharge, removal was complicated.

Moreover, when the washer for adjusting the thickness of the coin was mounted, the user needed to remove the disc for a discharge, or the user needed to remove the revolving shafts.

A discharge apparatus for the conventional disc bodies is shown in FIG. 7. A discharge apparatus is equipped with the disc for discharging the coin each one. A rotating shaft is inserted in the center section of a disc as to the discharge apparatus of FIG. 7. And, the coin is discharged when the disc is rotated. In other words, the disc for discharging a coin is fixed to the revolving shaft of the gear apparatus coupled with the electric motor as to the conventional discharge apparatus for disc bodies.

Therefore, the disc for discharging a coin needed to be exchanged depending on the size of the coin discharged. And, the disc for a discharge was fixed with the screw to the revolving shaft of a gear apparatus. Therefore, the removal was complicated.

SUMMARY OF THE INVENTION

It is an object of this invention to provide for a discharge apparatus for disc bodies which has a small and simple structure, which can easily change the disc for a coin discharge by one-touch and to which the regulation of the coin thickness is made extremely easily.

It is a further object of this invention to provide for a discharge apparatus of the disc body which can simply change the size of a discharge hole depending on the size of the disc body which desires a discharge and for which the disc for a discharge is simply changeable depending on the required coin size.

The invention offers a discharge apparatus for disc bodies which has a small and simple structure by arranging the rotating axle line of an electric motor, and the axis of rotation of a gear apparatus on the same straight line.

The discharge apparatus of this invention can easily exchange the discs for discharging coin by one-touch. Especially, the discharge apparatus by this invention can also perform a regulation of the coin thickness extremely simply.

BRIEF DESCRIPTION OF THE DRAWINGS

It follows a description of embodiments of this invention, referring to the attached drawings of which:

FIG. **1** is a generally perspective, exploded view of the present invention;

FIG. **2** is a generally perspective assembled view of apparatus of FIG. **1**;

FIG. **3** is a section view of the apparatus of FIG. **2**;

FIG. **4A** is a side view of the apparatus showing a first relative position;

FIG. **4B** is a view showing the apparatus in a second relative position;

FIG. **5** is an enlarged perspective view of another example of the shaft retaining stopper of FIG. **1**;

FIG. **6** is a perspective, exploded view and showing a further embodiment of the disc of this invention;

FIG. **7** is a perspective, assembled view of the disc of FIG. **6**;

FIGS. **8A** and B are an elevational view from FIG. **6**, FIG. **7**, respectively; and

FIG. **9** is an enlarged sectional and elevational view of a further embodiment of the disc of FIG. **6**.

DESCRIPTION

With reference to FIG. **1**, a large square plate member defines a substrate **11** for attachments. The central part of the substrate **11** is equipped with keyed through-hole **12**. The circle ring type small elevation body **13** is made from resin. The upper half of the elevation body **13** can elevate the inside of the through-hole **12** freely. In addition, the upper half of the elevation body **13** is equipped with a protrusion **14** of a detent. Therefore, it is desirable that the keys of the through-hole **12** and the elevation body **13** can elevate the

inside of the through-hole **12** and the elevation body **13** are cooperative square to provide for axial movement of the elevational body.

The lower half of the elevation body **13** is elongated to prevent the elevation body **13** from coming out of the through-hole **12**. The bottom of the elevation body **13** provides a plurality of saw-teeth **15**. A magnifying-glass type operation body **16** shown in the central part of FIG. **1** may be made from resin. The top part of a ring part thereof provides a saw-teeth **17**. The saw-teeth **17** can mesh with the saw-teeth **15** of the elevation body **13**. In addition, the haft part of the operation body **16** includes an arc type long hole **18**. The operation body **16** is fixed by a screw to the undersurface of the substrate **11** via the long hole **18**.

As to the bottom of FIG. **1**, a ring type thick fairly large cover plate **31** cooperates to enclose a planetary gear apparatus **30** (refer FIG. **3**). This cover plate **31** is fixed to the undersurface of the substrate **11** via plurality screws passing through collars **21**.

A short revolving shaft **19** is inserted in the through-hole **12**, the ring type elevation body **13**, the ring part of the operation body **16** and the cover plate **31** as shown in top part of FIG. **1** to rotate freely thereon. A disc **22** is coupled to the upper-part end of the revolving shaft **19**. The disc **22** is fixed to the revolving shaft **19** by means of a screw **23** (refer FIG. **3**). In other words, the revolving shaft **19** is fixed integrally in the center of the disc **22**. Therefore, the disc **22** and the revolving shaft **19** may be integrally formed by sintered metal, etc.

As to the left part of the center of FIG. **1**, there is included a stopper **10**. The stopper **10** is equipped with a wedge part **9** of a tooth shape. The stopper **10** prevents the revolving shaft **19** from coming off the assembly. The short revolving shaft **19** is explained below. The revolving shaft **19** is made from a metal. The revolving shaft **19** is equipped with a cone part **8**. The upper end part of the revolving shaft **19** comprises a D shape nut part **7** received through a cooperatively shaped hole in the disc **22**. The lower-end part of the revolving shaft **19** comprises a hexagonal gear part **6**. Furthermore, the disc type thick planet-gear apparatus in FIG. **3** is explained here.

First, the projection edge part of the cylinder type rotating shaft (not shown) of the electric motor **40** is equipped with a small sun type gear (not shown). And, a plurality of planet gears (not shown) is arranged so that it may gear around a sun type gear. Furthermore, a large internal-tooth gear (not shown) which gears with a planet gear is fixed. And, each shaft of a planet gear is rotatably inserted in a hole **33** of a carrier board **32** (see FIG. **1**). Therefore, if the electric motor **40** is operated, the carrier board **32** and gear arrangement will reduce speed and rotate the shaft **19**.

The carrier board **32** is equipped with a splined bore **34** at a central part. The gear part **6** of the revolving shaft **19** is cooperatively splined for insertion through the cylinder bore **34**.

As to the discharge apparatus of this example which consists of the above mentioned component, as shown in FIG. **2** and **3**, the upper half of the elevation body **13** is first positioned and vertically movable through the through-hole **12** of the substrate **11**. And, the ring part of the operation body **16** is in contact with the bottom of the elevation body **13**. The saw-teeth **15** and **17** gear and the haft part of the operation body **16** is fixed by connection of the operation body **16** to the undersurface of the substrate **11**. That is, a screw (not shown) is inserted in the long hole **18** of the haft part of the operation body **16** and is fixed to the undersurface of the substrate **11**.

Next, as to the undersurface of the substrate **11**, the planet-gear apparatus **30** and the electric motor **40** are attached via a plurality of collars **21** and the cover plate **31**. And, the nut part **7** of the revolving shaft **19** is penetrated in the central hole of the disc **22** and is fixed by a screw **23** (refer FIG. **3**). After this, the gear part **6** of the revolving shaft **19** is through the ring type elevation body **13**, the ring part of the operation body **16** and the ring type cover plate **31**.

The gear part **6** is further inserted in the cylinder bore **34** of the carrier board **32** of the planetary gear apparatus **30** and is geared mutually. Hereafter, the wedge part **9** at the end of the stopper **10** is penetrated via the long hole **5** of the ring part in the operation body **16** and the hole of the cylinder part **35** which is formed in the central part of the cover plate **31**. In this way, the wedge part **9** contacted with the cone part **8** of the revolving shaft **19** thereby the revolving shaft **19** is prevented (refer FIG. **3**) from coming off and releasing the disc **22**. In addition, the stopper **10** is locked by screw (not shown) on the undersurface of the substrate **11** via the long hole **4** of an element edge part.

The situation of FIG. **2** and **3** is shown in (A) of FIG. **4**. That is, the operation body **16** is not operated. That is, the elevation body **13** completely meshes into gears with the operation body **16** via saw-teeth **15** and **17**. In other words, the elevation body **13** has not projected from the substrate **11** and thereby spaces the disc **22** relative to the substrate **11** in a first relative position and related to the thickness of disc bodies accepted into openings in the disc **22**. Therefore, since the space **3** of the substrate **11** and the disc **22** is the lowest, the thin disc bodies (not shown) such as coins are applicable. If the haft part of the operation body **16** is rotated when the disc bodies such as coins are thicker, the elevation body **13** will be adjusted via the engagement between saw-teeth **15** and **17**. Therefore, as shown in (B) of FIG. **4**, the space **2** of the substrate **1 1** and the disc **22** is increased and can adapt the thickness of thicker disc bodies such as thicker coins. That is, the inclination surface which forms the saw-teeth **15** of the elevation body **13** raises by the inclination surface which forms the saw-teeth **17** of the operation body **16**. As a result, the elevation body **13** projects from the substrate **11** and displaces the disc **22** which it engages. The bottom of the elevation body **13** provides an inclination surface. The operation body **16** with the ramp contacted to an inclination surface is produced. And, the operation body **16** is slideably arranged for the substrate **11**. In this case, the adjustment of the operation body **16** and disc **22** is provided without rotation. Therefore, the elevation body **13** and disc **22** can raise.

In addition, as to this above-mentioned example, the central-axis line of the whole apparatus is aligned along one central-axis line **41** as clearly shown in FIG. **3**. That is, the central-axis line of the revolving shaft **19**, the central-axis line of the thick disc type planetary gear apparatus **30** and the central-axis line of the electric motor **40** are lying in a straight line. For this reason, the structure becomes simple and firm. Moreover, the attachment of an apparatus becomes easy. Therefore, the disc bodies such as coins can be discharged from any selected direction of 360 degrees. Furthermore, if the disc **22** and the revolving shaft **19** are formed integrally, they can be coupled by one step only by the gear part **6** being inserted in the cylinder bore **34**. In other words, they can couple only by the gear part **6** of the lower end of the revolving shaft **19** being inserted in the cylinder bore **34** of the carrier board **32**.

Moreover, the discharge apparatus of this example can be simply adjusted to the coin thickness. For this reason, as the